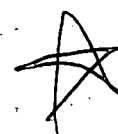




EPA Region 8

Stimson Lumber Company
Libby, Montana

November 2002



Draft Asbestos *Air*
Sampling Report

**Response Action Contract for Remedial,
Enforcement Oversight, and Non-Time Critical
Removal Activities at Sites of Release or
Threatened Release of Hazardous Substances in
EPA Region 8**

Draft Asbestos Air Sampling Report
for
Stimson Lumber Company
Libby, Montana

Contract No. 68-W5-0022
Document Control No. 3282-116-RT-OTHR-15756

Prepared for:
U. S. Environmental Protection Agency
Region 8
999 18th Street, Suite 500
Denver, Colorado 80202

Prepared by:
CDM
1331 17th Street, Suite 1050
Denver, Colorado 80202

November 22, 2002

Contents

Section 1 - Objective

1.1	Background.....	1-1
1.1.1	Site Location	1-2
1.1.2	Site History	1-2
1.1.2.1	Site Visits	1-2
1.1.2.2	Buildings Investigated as Part of Air and Dust Sampling ...	1-6
1.1.3	Environmental Setting	1-7
1.1.4	Contaminant of Concern.....	1-7
1.1.5	Previous Investigation	1-7

Section 2 - Soil Sampling..... 2-1

Section 3 - Air Sampling

3.1	Personal Air Sampling	3-1
3.1.1	Sample Locations	3-1
3.1.2	Sample Collection	3-2
3.1.3	Sample Analysis.....	3-3
3.1.4	Summary of Results.....	3-4
3.2	Ambient Air Sampling	3-9
3.2.1	Sample Locations.....	3-9
3.2.2	Sample Collection	3-10
3.2.3	Sample Analysis.....	3-11
3.2.4	Summary of Results.....	3-11

Section 4 - Microvacuum Dust Sampling

4.1	Sample Locations	4-1
4.2	Sample Collection	4-2
4.3	Sample Analysis.....	4-3
4.4	Summary of Results.....	4-3

Section 5 - Quality Assurance

5.1	Adherence to the Sampling and Analysis Plan	5-1
5.2	Deviations	5-1
5.2.1	Deviations During Ambient Air Sample Collection	5-1
5.2.2	Deviations During Dust Sample Collection.....	5-2
5.3	Corrective Actions	5-2
5.4	Discussion of Quality Control Results	5-2

Section 6 - References..... 6-1

Appendices

- Appendix A* - Analytical Data Sheets
Appendix B - EPA SOP 2015
Appendix C - Employee Orientation Form
Appendix D - American Society for Testing and Materials D-5755-95

Tables

3-1	Task-Based Sample Numbers.....	3-2
3-2	Personal Air Sampling - TWA Extended Work Shift (EWS) Results	3-5
3-3	Excursion Air Sampling Results.....	3-8
3-4	Ambient Air Sampling Locations.....	3-10
3-5	Stationary Air Sampling Results.....	3-12
4-1	Microvacuum Dust Sampling Results.....	4-4

Figures

1-1	Site Location Map.....	1-3
1-2	Stimson Lumber Co. Plywood Plant, Employee Parking Lot, Finger Joint Building.....	1-4
1-3	Stimson Lumber Co. Central Maintenance, Log Yard	1-5
2-1	Stimson Lumber Co. Site Map.....	2-2

Acronyms

AHERA	Asbestos Hazard Emergency Response Act
ASTM	American Society for Testing and Materials
BZ	breathing zone
CDM	CDM Federal Programs Corporation
CFR	Code of Federal Regulations
CSS	contaminant screening study
EL	excursion limit
EPA	Environmental Protection Agency
EWS	extended work shift
f/cc	fibers per cubic centimeter
FJ	finger joint
ISO	International Organization for Standardization
LA	Libby Amphibole
lpm	liters per minute
MCE	mixed cellulose ester
MCS	MCS Environmental
mm	millimeter
ND	non-detect
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PCM	phase contrast microscopy
PEL	permissible exposure limit
PES	Pacific Environmental Services
RI	remedial investigation
SAP	sampling and analysis plan
SOP	standard operating procedure
Stimson	Stimson Lumber Company
TWA	time-weighted average
USDA	United States Department of Agriculture
cm ²	square centimeters
μm	micrometers

Section 1

Objective


The U. S. Environmental Protection Agency (EPA) has determined that materials originating from the Libby, Montana, vermiculite mine are sources of amphibole asbestos and should be removed (EPA 2002). Therefore, current investigations at residential and commercial properties in Libby focus on finding these source materials. However, because of the complexity of the Stimson Lumber Company (Stimson) facility relative to most properties under investigation in Libby, less was known about potential exposures, if any, that may result from disturbances of source materials. Therefore, the EPA determined that a more comprehensive investigation was required at Stimson than at other less complex commercial properties in Libby.

To investigate the potential impacts of these source materials, the EPA pursued a two-part approach. Initially, personal air, stationary air, and microvacuum dust samples were collected in areas where vermiculite is known or suspected to be present. These samples were collected to determine potential exposure information in these areas. The results of this air and dust sampling effort are discussed in this report. All sampling was conducted in accordance with the *Property Specific Sampling and Analysis Plan, Air and Dust Sampling, Stimson Lumber Company, Libby Asbestos Project, Libby, Montana*, (CDM Federal Programs Corporation [CDM] 2002a).

Secondly, the EPA conducted a study to screen all areas of the facility for potential amphibole asbestos sources, similar to the contaminant screening study (CSS) currently in progress at properties in Libby. *This report will be updated. bdd*

The primary objective of this effort is to document and delineate potential sources of amphibole asbestos in a comprehensive, systematic manner.

presented in this document. EPA
The results of the two part study are combined and summarized in this document to:
will use this information to:

- Determine the need for any immediate actions
 - Determine the need for removal actions
 - Prioritize any future removal activities across the facility
 - Determine the extent of contamination
 - Delineate areas found not to contain amphibole asbestos contamination
- 

1.1 Background

Historical information regarding the Stimson property in Libby, Montana, suggests that vermiculite products were used at, or transported to, the property at various times and at various locations. Much of this material is still present. Additionally, vermiculite insulation was installed in structures used for daily plant operations. It is

believed that these products contain varying levels of the amphibole asbestos with compositions including tremolite, actinolite, richterite, and winchite (herein referred to as Libby Amphibole [LA]).

1.1.1 Site Location

Stimson is situated in the eastern section of Libby, Montana, on U. S. Highway 2 South (Figure 1-1). The facility is currently owned by Stimson Lumber Company and other private parties. The majority of the facility is currently used for manufacturing plywood board. The facility covers approximately 200 acres and encompasses processing, office, and other support buildings. In addition, a log yard and woodchip and mulch yard occupy a significant portion of the property.

1.1.2 Site History

The employee parking lot area used by Stimson employees was once used as an aboveground storage area for vermiculite insulation. Vermiculite insulation was stockpiled directly on the native soil surface and may have contaminated the area with measurable amounts of asbestos mineral fibers. The area was converted to a parking lot in 1990.

A landscaping nursery was previously located along the southern boundary of the Stimson property. It is believed that unexfoliated, or raw vermiculite, was introduced to the site for use as a growth media and fill material. Currently the area remains a vacant lot with sparse vegetation. The lot is currently used to stockpile wood chips (collected from 1991 through 1997).

An overview of the facility layout is presented in Figures 1-2 and 1-3.

1.1.2.1 Site Visits

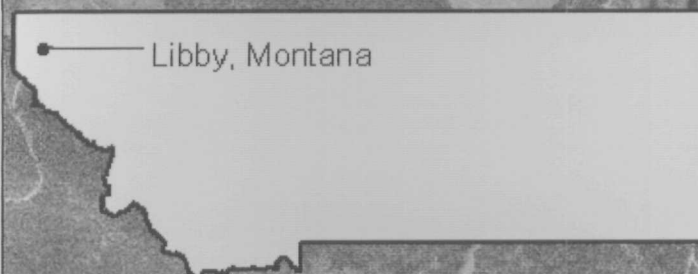
An initial site visit was conducted on September 28, 2001, by Dr. Chris Weis (EPA regional toxicologist), CDM, and Pacific Environmental Services (PES). Stimson personnel present during this meeting included Mr. Fred Sturgess (Libby complex manager), Ms. Veronica Bovee (health and safety coordinator), Mr. John Chopot (environmental manager), and Mr. Barry Brown (local union No. 2581 president). The site meeting included interviews with current employees and a walk-through of several areas of the facility.

A coordination meeting was held on September 9, 2002 at the Stimson site. Attendees included CDM and PES personnel. Stimson personnel present during this meeting included Ms. Veronica Bovee (Stimson health and safety coordinator), Mr. Fred Sturgess (Libby complex manager), and the operations managers for each building. Sampling locations and tasks were discussed, and a list of locations and personnel to be sampled was developed, as presented in the sampling and analysis plan (SAP). A site visit was conducted to familiarize project personnel with the entire facility and the processes in each building to be sampled.

Color Map(s)

The following pages
contain color that does
not appear in the
scanned images.

To view the actual images, please
contact the Superfund Records
Center at (303) 312-6473.



800 0 800 1600 Feet

Map Created November, 2002

CDM



LEGEND


 Stimson Lumber Property

Figure 1-1
Site Location Map
Stimson Lumber Company
Libby, MT



70 0 70 140 Feet

Map Created November, 2002

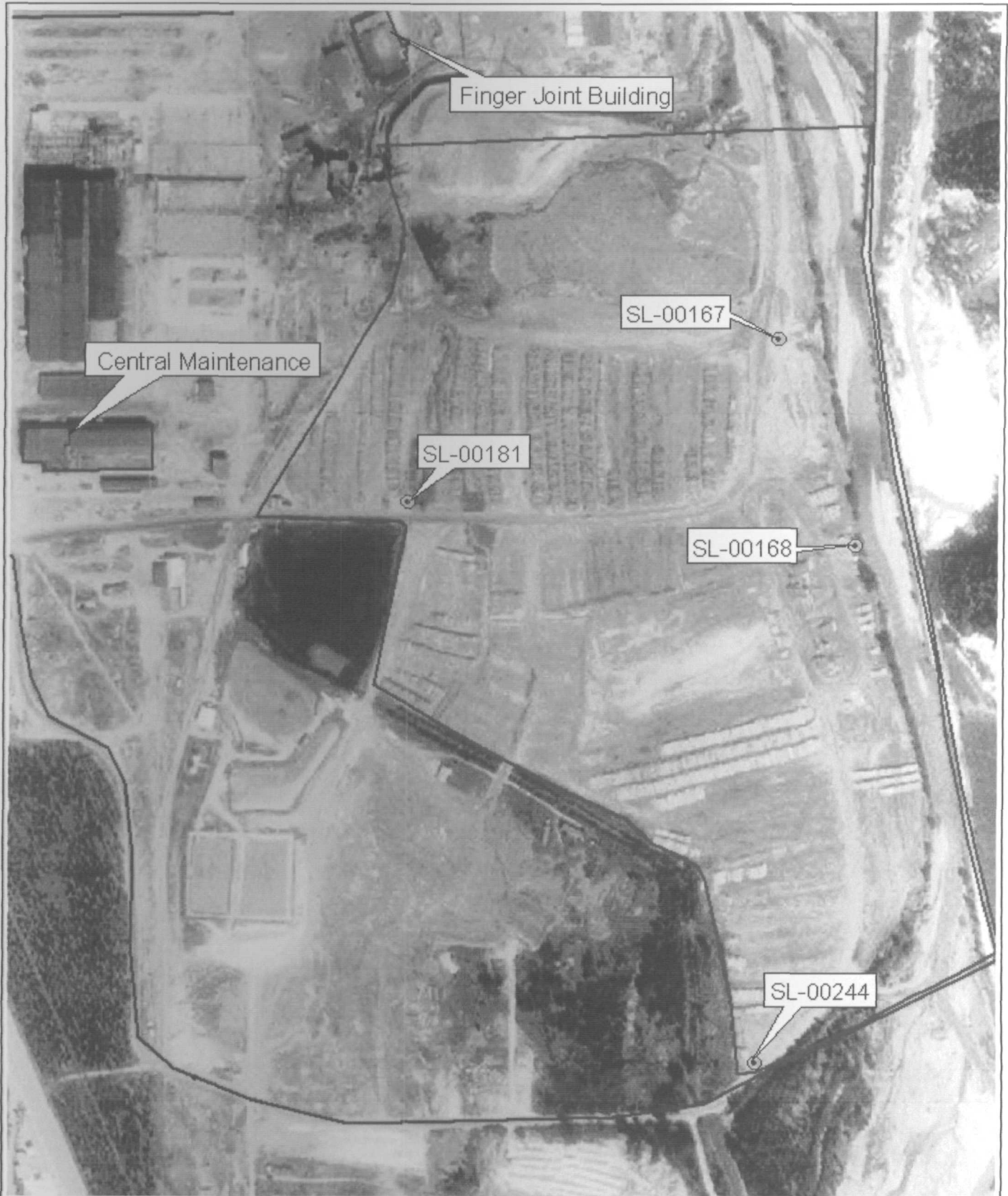
CDM



LEGEND

- Stimson Lumber Property
- Areas of Concern
- Outdoor Samples

Figure 1-2
Stimson Lumber Company
Plywood Plant, Employee Parking Lot,
Finger Joint Building
Libby, MT



100 0 100 200 Feet

Map Created November, 2002

CDM



LEGEND




-  Stimson Lumber Property
-  Areas of Concern
-  Outdoor Samples

Figure 1-3
Stimson Lumber Company
Central Maintenance, Logyard
Libby, MT

A progress meeting was held on September 17, 2002, at the Stimson office. Attendees included Mr. Greg Parana and Ms. Melissa Petrak of PES, and Ms. Veronica Bovee of Stimson. Topics discussed included:

- Samples collected to date, and plans for remaining sample collection
- Samples reported overloaded by the laboratory and resampling of the affected locations and tasks
- Buildings in which microvacuum dust samples would not be collected
- Bag house function and its affect on air samples collected in the plywood plant

An informal closeout meeting was scheduled for September 19, 2002, at the Stimson office. Ms. Veronica Bovee of Stimson was unavailable at the appointed time, so Ms. Melissa Petrak left a summary of samples collected for her records. Ms. Bovee was advised to contact the EPA Information Center with any questions or concerns.

1.1.2.2 Buildings Investigated as Part of Air and Dust Sampling

The central maintenance building currently contains vermiculite insulation. This structure is equipped with a large gantry crane that traverses the length of the building. As stated earlier, movement of this crane causes vibration within the structure and may release small amounts of vermiculite insulation from around seams and joints of the clapboard walls. There is a large main work area with vehicle bays, along with several smaller shops, a parts warehouse, locker room, break room and, supervisor's office. Central maintenance personnel work throughout the building on a variety of tasks, mostly involving vehicle and equipment maintenance and repair (Figure 1-3).

The plywood plant is currently used for processing plywood. Vermiculite insulation is believed to be associated with the big dryer No. 1 in this building. The plywood plant is one large open area, through which wood travels while being processed from logs to plywood. There are offices, break rooms, and rest rooms along the edges of the building. The debarker and log heating facility is outside and adjacent to the main plant structure (Figure 1-2). Plywood plant personnel generally work at their assigned task, although there is some rotation for relief purposes.

The finger joint (FJ) building is currently used for FJ operations. There is a main work area, along with the feeder No. 2 room, and the "wrap and stack" room. There is also a connection to Shed 12, which is a board storage area. FJ utility workers rotate tasks throughout the plant during the work shift, while a few employees work only on specific tasks. According to Veronica Bovee, the old lunchroom and bathroom area of the building previously contained vermiculite insulation, which was removed in May of 2000. The room is currently used for parts storage (Figure 1-2).

1.1.3 Environmental Setting

Mean annual precipitation in Libby is 19.4 inches, with 30 percent of it occurring in the months of November through January, and 18 percent falling in the months of May and June. The month having the highest average precipitation is January, with 2.42 in. Average ambient temperature in Libby ranges from 22.4°F in January, to 67°F in July. Average annual precipitation at the W.R. Grace vermiculite mine site is estimated at 20 inches per year (U. S. Department of Agriculture [USDA] 1977), and the temperature would be expected to average 3 to 5 degrees cooler than in Libby. Climatological data was obtained from the Libby 1 N.E. Ranger station.

1.1.4 Contaminant of Concern

The potential contaminant of potential concern investigated at this facility is asbestos. Asbestos fibers are odorless and tasteless and vary in length, structure, and chemical composition. Fibers are microscopic and environmentally persistent. They do not evaporate, burn or dry out from heat, or erode in water. Toxicity of different type fibers varies, but exposure to any one of them can be fatal. Tremolite, the form found at Libby, is considered by many to be the most toxic.

The human health risks associated with asbestos fibers released in the environment include:

- Asbestosis - a scarring of the lungs, which impairs elasticity of the lung
- Lung Cancer - a malignant tumor of the bronchi covering
- Mesothelioma - a cancer of the lining of the chest or of the abdominal wall
- Other diseases - increased incidence of some non-respiratory cancers has been seen in those exposed to asbestos

Asbestos related diseases have a latency period of 15 to 30 years, and the risks of asbestos exposure are significantly increased by smoking.

1.1.5 Previous Investigation

At the request of Stimson, MCS Environmental (MCS) performed industrial hygiene sampling to determine the potential exposure of Stimson employees to residual asbestos. Air samples taken within the central maintenance building and the plywood plant revealed concentrations of LA less than the Asbestos Hazard Emergency Response Act (AHERA) standard of <0.01 fibers/cubic centimeter (f/cc) for phase contrast microscope (PCM) analysis (40 Code of Federal Regulations [CFR] Part 763, 763.90 (i)(5).)

In addition, soil and bulk samples were taken from various locations around the facility including the central maintenance building, the former nursery, and the employee parking lot. While analysis of soils collected from the employee parking lots

were all non-detect for asbestos, soils collected from the nursery area had concentrations of tremolite asbestos as high as 5 percent.

On May 2, 2002, two microvacuum dust samples were collected from the nursery shed. These samples, along with one field blank were analyzed by the International Standards Organization (ISO) 10312 method. The analysis of sample 1-06850 identified 5853 LA structures with lengths between 0.5 micrometers (μm) and 5 μm and 1170 LA structures with lengths between 5 μm and 10 μm . Sample 1-06850 was a composite of three locations in the nursery shed. No LA structures were detected on sample 1-06857, which was a composite of three locations on the floor of the nursery shed, or in sample 1-06858, the field blank. Analytical datasheets are included in Appendix A.

Section 2

Soil Sampling

Soil sampling at Stimson was designed for the quantification of relative LA abundance in soils throughout the site following all rational, data quality objectives, quality assurance procedures, and standard operating procedures (SOPs) from the *Final Sampling and Analysis Plan (SAP) for the Remedial Investigation (RI) Contaminant Screening Study (CSS), Libby Asbestos Site, OU4* (CDM 2002b). For purposes of this investigation a site-specific SAP addendum was developed to the CSS SAP: *Final SAP Addendum for the Stimson Lumber Company Area, Libby Asbestos Site, OU4* (CDM 2002c). All soil investigation work was conducted in accordance with this SAP addendum.



To adequately characterize LA abundance in soils throughout Stimson, the site was divided into eight subareas (Figure 2-1): former popping plant, railroad spur, lumber yard, log storage yard, southwest area, former Champion International tree nursery, sprinkler field, and Superfund site. These divisions were made based on assumed contaminant concentrations, land use, and environmental setting. During this investigation, no sampling was conducted within the sprinkler field or Superfund Site subareas and, therefore, these subareas will not be discussed.

Def. c

not pre-estimated

Surface and subsurface samples were collected from each subarea as follows:

Subarea	Surface Soil Samples	Subsurface Soil Samples
Former Popping Plant	16	7
Railroad Spur	14	0
Lumber Yard	25	6
Log Storage Yard	29	4
Southwest Area	14	3
Former Champion International Tree Nursery	11	8
Sprinkler Field	0	0
Superfund Area	0	0
Total	109	28

Once results are available, this document will be updated.

Section 3

Air Sampling

3.1 Personal Air Sampling

A total of 124 personal breathing zone (BZ) samples from 10 Stimson employees were collected. Ninety-seven air samples were collected for the duration of the work activity. The results of these samples were then calculated as time-weighted averages (TWAs) for the full shift (8, 10, or 12 hours) and compared to the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) and/or the OSHA extended work shift PEL for asbestos. Twenty-seven samples were collected for 30 minutes (approximately) and compared to OSHA's 30-minute excursion limit (EL) for asbestos.

3.1.1 Sample Locations

Personal air sampling locations and tasks were selected during the pre-sampling facility visit on September 9, 2002. All locations and tasks were approved by EPA as presented in the SAP. These tasks represent normal and general duties typically performed by Stimson employees. Sampling locations and associated tasks at each location are summarized below:

- Plywood plant (Figure 1-2)
 - Dryer tender 1 - performed oversight on the dryers, troubleshooting, temperature, and steam tracking
 - Dryer feeder 2 - fed boards into dryer, general housekeeping
 - Dryer offbearer 3 - sorted and tended boards coming out of dryer
 - Plugger 4 - operated plugger machine
 - Green chain puller 5 - sorted wood from lathe along green chain
- Central maintenance building (Figure 1-3)
 - Mechanics (two employees) - performed repairs and maintenance on facility vehicles and machinery
- Finger joint building (Figure 1-2)
 - FJ utility - worked at all stations throughout FJ plant, including general housekeeping and forklift operation
- Log yard (Figure 1-3)
 - Wagner operator - operated Wagner Lumberjack, unloading and moving logs throughout log yard and to plywood plant area

Table 3-1 presents the number and type of samples collected at each task and location during the sampling activities.

Table 3-1
Task-Based Sample Numbers

Location	Task	No. of Samples Collected	
		Duration of Full Shift	30-Minute Excursion
Plywood Plant	Dryer tender	11	3
	Dryer feeder	12	3
	Dryer offbearer	11	3
	Plugging	9	3
	Green chain puller	13	3
Central Maintenance	Mechanic 1	6	3
	Mechanic 2	7	3
Finger joint	Finger joint utility	16	3
Log Yard	Wagner operator	12	3

3.1.2 Sample Collection

Personal air samples were collected on Stimson employees for 3 consecutive days, between September 10 and September 16, 2002. All samples were collected in accordance with the EPA Standard Operating Procedure (SOP) 2015 *Asbestos Sampling* (Appendix B). Sample volume requirements were in accordance with OSHA *Construction Standard for Asbestos*, 29 CFR 1926.1101. All air sampling pumps were calibrated from 1.5 to 2.03 liters per minute (lpm) prior to the sampling period and again at the end of the sampling period. Air samples were collected using 0.8 μ m open-faced 25 millimeter (mm) mixed cellulose ester (MCE) filters, as described in the SAP. All cassettes were visually inspected approximately every 2 hours during sampling to ensure cassettes were not overloaded.

Due to a higher level of airborne particulates than anticipated, cassettes were changed more frequently than every 2 hours in an effort to prevent sample overload.

For all samples collected during this investigation (personal, ambient, and microvacuum dust), field blanks were submitted at the rate of 10 percent and/or a minimum of two field blanks per sample batch per day. Field blanks were prepared at the time of sampling at the sampling location by removing the cassette cap for 30 seconds and then replacing the cap. A total of 26 field blanks were collected. All field blank cassettes originated from the field sampling cassette lot. One half of the field blanks submitted each day were analyzed, the remaining half were archived for later analysis if necessary. All field blanks analyzed during this investigation returned results of "ND," or no detected fibers at or above the detection limit. Field blank results are included in the Libby database printout presented in Appendix A.

Prior to receipt of new sampling cassettes in the field, a new unused cassette was sent to the laboratory. Results from these lot blanks determined the background asbestos structure concentration for the lot of cassettes. Specific cassette lot blanks analyzed during this project included 25mm three-piece cassettes with 0.8 μ m MCE Filters for Lot

Numbers 21078 and 4583. All lot blanks analyzed during this investigation returned results of ND, or no detected fibers at or above the detection limit. Lot blank results are included in the Libby database printout presented in Appendix A.

Each employee selected to wear a pump was given a brief description of the purpose of personal sampling, as well as an explanation of the sampling procedure. This explanation included instruction to contact the sampling technician immediately if there were any problems with the sampling pump (e.g., pump falling off or stopping, or cassette loss or damage). This information was provided to each employee in writing and reviewed in person. Each of the selected employees provided their name, last 4 digits of their social security number (for sample tracking purposes), and job title on a form, which they signed and dated on the first day of sampling. A copy of this form is attached in Appendix C.

Employees wore pumps clipped to either the waistline of their pants, their own belt, or a belt that was provided. Tubing ran up their backs to the cassette, which was clipped to the collar or neckline of the employee's shirt, within the BZ, as described in the SAP. Clips or tape were sometimes used to secure tubing to the back of the employee's shirt, to prevent it from snagging or being caught on equipment. Employees were advised that the cassette must stay within their BZ for the duration of sample collection. Employees were questioned at the intervals when cassettes were visually inspected and at the end of each shift to determine if there were any problems with the sampling pump or cassette.

3.1.3 Sample Analysis

Air samples were analyzed by EMSL Analytical, Inc. (EMSL) in Libby, Montana, and Westmont, New Jersey; Reservoirs Environmental Services in Denver, Colorado, and/or Hygeia in Sierra Madre, California. All samples were analyzed in accordance with the ISO 10312, *Air Quality - Determination of Asbestos Fibers - Direct Transfer Transmission Electron Microscopy Method*, 1995; National Institute for Occupational Safety and Health (NIOSH) *Method 7400, Asbestos and other Fibers by Phase Contrast Microscopy (PCM)*; and/or Appendix A of the EPA *Asbestos - Containing Materials in Schools: Final Rule and Notice*. If an air sample was determined to be overloaded, it was not analyzed by indirect preparation.

Samples were maintained under chain of custody procedures. After sample collection was completed, EPA custody labels were completed and affixed to each sampling cassette. Sample information was entered on chain of custody forms, and changes in sample custody noted on the form. Samples were relinquished to the sample coordinator and submitted for laboratory analysis. Any samples not immediately relinquished to the sample coordinator were secured in the sample storage cabinet. Samples were either hand-delivered to the EMSL onsite laboratory in Libby, Montana, or shipped via Federal Express to an offsite laboratory.

3.1.4 Summary of Results

The personal air samples were collected based on task. Each task was sampled for 3 consecutive days, for the duration of the work shift. One excursion limit sample was collected from each employee sampled on each of his or her 3 sampling days. A summary of TWA sample results, including calculated extended work shift values, is presented in Table 3-2. Extended work shift permissible exposure limits were determined using a standard OSHA formula (American Industrial Hygiene Journal 2000). A summary of excursion limit sample results is presented in Table 3-3. A complete Libby database printout of personal air sample results is attached in Appendix A.

Personal air samples were collected on two employees in the Central Maintenance building: Mechanic 1 and Mechanic 2. Both central maintenance employees worked an 8-hour shift each sampling day. Asbestos structures were detected by TEM AHERA analysis on one of the six samples (SL-00018) collected on Mechanic 1. Asbestos structures were detected by TEM AHERA analysis on two of the seven samples (SL-00012 and SL-00054) collected on Mechanic 2. TWA calculation based on the PCM analysis results showed no exposures above the OSHA PEL.

Personal air samples were collected on one employee in the FJ building: FJ Utility. FJ Utility worked a 10-hour shift each sampling day. Asbestos structures were detected by TEM AHERA analysis on one of the 16 samples collected on FJ Utility, SL-00051. One sample, SL-00198, was overloaded for PCM analysis, and therefore TWA calculation was not possible for that date. TWA calculation based on the PCM analysis results for the remaining dates showed no exposures above the PEL.

Personal air samples were collected on one employee in the Log yard: Wagner Operator. The Wagner operator worked an 8-hour shift each sampling day. Asbestos structures were detected by TEM AHERA analysis on one of the twelve samples collected on the Wagner Operator, SL-00055. Two samples, SL-00166 and SL-00189, were overloaded for PCM analysis, and therefore TWA calculation was not possible for that date. TWA calculation based on the PCM analysis results for the remaining dates showed no exposures above the PEL. Extended work shift (EWS) TWA calculation based on the PCM analysis results for the remaining dates showed no exposures above the calculated EWA PEL.

Five employees were sampled in the Plywood Plant: Dryer Feeder, Dryer Tender, Dryer Offbearer, Green Chain Puller, and Plugger. The Dryer Feeder, Dryer Tender, and Dryer Offbearer worked 12-hour shifts the first 2 sampling days, and a 6-hour shift the 3rd day. The Green Chain Puller worked 10-hour shifts each of the 3 sampling days, and the Plugger worked 8-hour shifts each of the 3 days.

Asbestos structures were not detected by TEM AHERA analysis on any of the 11 samples collected on the Dryer Feeder. TWA calculation based on the PCM analysis

Table 3-2
Personal Air Sampling - TWA Extended Work Shift (EWS) Results

Building	Task	Sample Date	Index ID	PCM		TEM AHERA		Sample Time (min)	Work Shift (Hrs)	TWA ** 8-Hr (f/cc)	TWA-EWS (f/cc)	PEL-EWS (f/cc)
				Lab Result (f/cc)		Lab Result (S/cc) *						
Central Maintenance	Mechanic 1	10/Sep/02	SL-00002	< 0.005		ND		291	8	< 0.006	NA	NA
			SL-00011	< 0.008		ND		164				
Central Maintenance	Mechanic 1	11/Sep/02	SL-00018	< 0.005		0.005		291	8	< 0.006	NA	NA
			SL-00031	< 0.008		ND		166				
Central Maintenance	Mechanic 1	12/Sep/02	SL-00041	0.008		ND		173	8	< 0.006	NA	NA
			SL-00053	< 0.009		ND		146				
Central Maintenance	Mechanic 2	10/Sep/02	SL-00003	0.009		ND		292	8	< 0.008	NA	NA
			SL-00012	< 0.008		0.009		167				
Central Maintenance	Mechanic 2	11/Sep/02	SL-00019	< 0.004		ND		302	8	< 0.044	NA	NA
			SL-00032	< 0.119		ND		167				
Central Maintenance	Mechanic 2	12/Sep/02	SL-00042	0.008		ND		174	8	< 0.011	NA	NA
			SL-00048	0.021		ND		123				
Central Maintenance	Mechanic 2	12/Sep/02	SL-00054	< 0.009		0.013		143				
			SL-00001	0.03		ND		293				
Finger Joint	FJ Utility	10/Sep/02	SL-00009	0.02		ND		158	10	< 0.028	< 0.026	0.08
			SL-00014	< 0.012		ND		115				
Finger Joint	FJ Utility	11/Sep/02	SL-00017	< 0.135		ND		147	10	< 0.086	< 0.055	0.08
			SL-00029	< 0.161		ND		123				
Finger Joint	FJ Utility	12/Sep/02	SL-00035	0.015		ND		115	10	< 0.030	< 0.029	0.08
			SL-00040	0.035		ND		144				
Finger Joint	FJ Utility	12/Sep/02	SL-00045	< 0.013		ND		100				
			SL-00047	0.039		ND		55				
Finger Joint	FJ Utility	12/Sep/02	SL-00051	0.023		0.013		117				
			SL-00057	0.017		ND		97				
Finger Joint	FJ Utility	16/Sep/02	SL-00063	< 0.02		ND		69				
			SL-00161	0.187		ND		157				
Finger Joint	FJ Utility	16/Sep/02	SL-00183	0.279		ND		126	10	overloaded	overloaded	0.08
			SL-00198	overloaded		ND		173				
Log Yard	Wagner Operator	10/Sep/02	SL-00206	0.059		ND		116				
			SL-00005	< 0.088		ND		204	8	< 0.043	NA	NA
Log Yard	Wagner Operator	11/Sep/02	SL-00010	< 0.01		ND		129				
			SL-00013	< 0.009		ND		143	8	< 0.026	NA	NA
Log Yard	Wagner Operator	11/Sep/02	SL-00027	< 0.058		ND		172				
			SL-00030	< 0.007		ND		198				
Log Yard	Wagner Operator	12/Sep/02	SL-00033	< 0.012		ND		111				
			SL-00044	< 0.141		ND		127	8	< 0.081	NA	NA
Log Yard	Wagner Operator	12/Sep/02	SL-00050	< 0.163		ND		110				
			SL-00055	0.018		0.015		96				
Log Yard	Wagner Operator	16/Sep/02	SL-00058	< 0.012		ND		109	8	overloaded	NA	NA
			SL-00166	overloaded		ND		121				
Log Yard	Wagner Operator	16/Sep/02	SL-00189	overloaded		ND		143	8	overloaded	NA	NA

Table 3-2
Personal Air Sampling - TWA Extended Work Shift (EWS) Results

Building	Task	Sample Date	Index ID	PCM		TEM AHERA	Sample Time (min)	Work Shift (Hrs)	TWA ** 8-Hr (f/cc)	TWA-EWS (f/cc)	PEL-EWS (f/cc)
				Lab Result (f/cc)	Lab Result (S/cc) *						
Plywood Plant	Dryer Offbearer	13/Sep/02	SL-00076	0.031	ND	188	12		< 0.037	< 0.032	0.07
			SL-00086	0.05	ND						
			SL-00104	< 0.01	ND						
Plywood Plant	Dryer Offbearer	14/Sep/02	SL-00116	0.025	ND	118	12		< 0.094	< 0.086	0.07
			SL-00125	< 0.014	ND	124					
			SL-00137	< 0.014	ND	128					
			SL-00146	0.084	ND	90					
			SL-00147	0.106	ND	126					
Plywood Plant	Dryer Offbearer	16/Sep/02	SL-00153	0.109	ND	189	12		< 0.036	0.017	0.07
			SL-00160	0.05	ND	189					
Plywood Plant	Pluggler	13/Sep/02	SL-00187	0.048	ND	162	8		0.035	NA	NA
			SL-00078	0.04	0.015	132					
			SL-00088	0.039	ND	93					
Plywood Plant	Pluggler	14/Sep/02	SL-00099	0.038	ND	204	8		< 0.039	NA	NA
			SL-00131	< 0.015	ND	121					
			SL-00141	< 0.015	ND	119					
Plywood Plant	Pluggler	16/Sep/02	SL-00143	0.077	ND	195	8		0.053	NA	NA
			SL-00165	0.048	ND	143					
			SL-00188	0.113	ND	125					
			SL-00199	0.027	ND	169					
Plywood Plant	Dryer Feeder	13/Sep/02	SL-00074	0.034	ND	191	12		0.041	0.037	0.07
			SL-00085	0.029	ND	150					
			SL-00105	0.043	ND	39					
			SL-00101	0.024	ND	147					
Plywood Plant	Dryer Feeder	14/Sep/02	SL-00115	0.03	ND	118	12		< 0.060	< 0.055	0.07
			SL-00124	< 0.015	ND	120					
			SL-00134	< 0.014	ND	127					
			SL-00144	0.066	ND	119					
			SL-00150	0.035	ND	94					
Plywood Plant	Dryer Feeder	16/Sep/02	SL-00152	0.072	ND	197	12		0.016	0.008	0.07
			SL-00157	0.026	ND	190					
			SL-00185	0.018	ND	159					
Plywood Plant	Green Chain Puller	13/Sep/02	SL-00075	0.05	ND	179	10		0.056	0.054	0.08
			SL-00083	0.032	ND	166					
			SL-00093	0.036	ND	154					
			SL-00114	0.087	ND	79					
Plywood Plant	Green Chain Puller	14/Sep/02	SL-00123	< 0.015	ND	119	10		< 0.128	< 0.129	0.08
			SL-00133	< 0.014	ND	127					
			SL-00142	0.062	ND	114					
			SL-00148	0.128	ND	99					
			SL-00151	0.255	ND	149					

Table 3-2
Personal Air Sampling - TWA Extended Work Shift (EWS) Results

Building	Task	Sample Date	Index ID	PCM		Lab Result (S/cc) *	TEM AHERA		Sample Time (min)	Work Shift (Hrs)	TWA ** 8-Hr (f/cc)	TWA-EWS (f/cc)	PEL-EWS (f/cc)
				Lab Result (f/cc)			Lab Result (S/cc) *						
Plywood Plant	Green Chain Puller	16/Sep/02	SL-00158	0.059		ND	ND		190				
			SL-00184	0.037		ND	ND		176				
			SL-00200	0.026		ND	ND		111	10	0.054	0.055	0.08
			SL-00207	0.039		ND	ND		134				
Plywood Plant	Dryer Tender	13/Sep/02	SL-00073	0.015		ND	ND		196				
			SL-00084	0.016		ND	ND		269				
			SL-00110	0.044		ND	ND		120	12	0.032	0.031	0.07
			SL-00117	0.026		ND	ND		113				
Plywood Plant	Dryer Tender	14/Sep/02	SL-00126	< 0.014		ND	ND		124				
			SL-00138	< 0.015		ND	ND		117				
			SL-00145	0.095		ND	ND		113	12	< 0.093	< 0.087	0.07
			SL-00149	0.054		ND	ND		135				
Plywood Plant	Dryer Tender	16/Sep/02	SL-00154	0.125		ND	ND		185				
			SL-00159	0.024		0.014	0.014		187	12	0.022	0.011	0.07
			SL-00186	0.039		ND	ND		160				

* ND - Indicates no Libby Amphibole structures detected by TEM AHERA analysis.

** TWA measured against PEL of 0.1 f/cc, accordance with OSHA 1926.1101.

NA - Indicates no extended work shift (EWS) PEL is required.

AHERA - Asbestos Hazardous Emergency Response Act

EWS - Extended work shift

f/cc - Fibers per cubic centimeter

Hr - Hour

min - Minutes

PCM - Phase contrast microscopy

S/cc - Structures per cubic centimeter

TEM - Transmission electron microscopy

Table 3-3
Excursion Air Sampling Results

Building	Task	Sample Date	Index ID	Sample Time (min)	PCM Lab Result * (f/cc)	TEM AHERA Lab Result ** (S/cc)
Central Maintenance	Mechanic 1	9/10/2002	SL-00008	31	<0.043	ND
Central Maintenance	Mechanic 1	9/11/2002	SL-00025	30	<0.044	ND
Central Maintenance	Mechanic 1	9/12/2002	SL-00043	32	<0.041	ND
Central Maintenance	Mechanic 2	9/10/2002	SL-00007	30	<0.044	ND
Central Maintenance	Mechanic 2	9/11/2002	SL-00026	30	<0.044	0.049
Central Maintenance	Mechanic 2	9/12/2002	SL-00056	35	<0.038	ND
Finger Joint	FJ Utility	9/10/2002	SL-00004	34	0.064	ND
Finger Joint	FJ Utility	9/11/2002	SL-00028	31	<0.043	ND
Finger Joint	FJ Utility	9/12/2002	SL-00046	30	<0.044	ND
Log Yard	Wagner Operator	9/10/2002	SL-00006	32	<0.041	ND
Log Yard	Wagner Operator	9/11/2002	SL-00034	35	<0.038	ND
Log Yard	Wagner Operator	9/12/2002	SL-00052	30	<0.044	0.049
Plywood Plant	Dryer Feeder	9/13/2002	SL-00103	31	0.078	ND
Plywood Plant	Dryer Feeder	9/14/2002	SL-00135	30	<0.044	ND
Plywood Plant	Dryer Feeder	9/16/2002	SL-00191	31	<0.043	ND
Plywood Plant	Dryer Offbearer	9/13/2002	SL-00113	30	<0.044	ND
Plywood Plant	Dryer Offbearer	9/14/2002	SL-00136	30	<0.044	ND
Plywood Plant	Dryer Offbearer	9/16/2002	SL-00194	33	<0.04	ND
Plywood Plant	Dryer Tender	9/13/2002	SL-00109	30	<0.044	ND
Plywood Plant	Dryer Tender	9/14/2002	SL-00139	32	<0.041	ND
Plywood Plant	Dryer Tender	9/16/2002	SL-00193	31	<0.043	ND
Plywood Plant	Green Chain Puller	9/13/2002	SL-00100	30	<0.044	ND
Plywood Plant	Green Chain Puller	9/14/2002	SL-00132	30	<0.044	ND
Plywood Plant	Green Chain Puller	9/16/2002	SL-00192	30	<0.044	ND
Plywood Plant	Plugger	9/13/2002	SL-00095	32	<0.041	ND
Plywood Plant	Plugger	9/14/2002	SL-00140	36	<0.037	ND
Plywood Plant	Plugger	9/16/2002	SL-00190	30	<0.044	ND

* Result measured against Excursion Limit of 1.0 f/cc, in accordance with OSHA 1926.1101.

** ND indicates no Libby Amphibole structures detected by TEM AHERA analysis.

AHERA - Asbestos Hazardous Emergency Response Act

f/cc - Fibers per cubic centimeter

min - Minutes

PCM - Phase contrast microscopy

S/cc - Structures per cubic centimeter

TEM - Transmission electron microscopy

CDM

STIMAS.T33

results showed no exposures above the PEL. EWS TWA calculation based on the PCM analysis results showed no exposures above the calculated EWS PEL.

Of the 11 samples collected on the Dryer Tender, asbestos structures were detected by TEM AHERA analysis on one sample, SL-00159. The TWA calculation based on the PCM analysis results for the remaining dates showed one exposure above the PEL. The calculated extended work shift TWA for September 14, 2002, was <0.087 f/cc, which is above the calculated extended work shift PEL of 0.07 f/cc. However, this overexposure is not conclusive, because the high limit of detection does not allow for a valid comparison between the values.

Asbestos structures were not detected by TEM AHERA analysis on any of the 11 samples collected on the Dryer Offbearer. TWA calculation based on the PCM analysis results showed no exposures above the PEL. EWS TWA calculation based on the PCM analysis results showed no exposures above the calculated EWS PEL.

Asbestos structures were not detected by TEM AHERA analysis on any of the 13 samples collected on the Green Chain Puller. TWA calculation based on the PCM analysis results for the remaining dates showed one exposure potentially above the PEL. The EWS TWA calculated for September 16, 2002, was <0.054 fibers per cubic centimeter (f/cc), which is less than the calculated EWS PEL of 0.08 f/cc.

Asbestos fibers were detected by TEM AHERA analysis on one of the nine samples collected on the Plugger, SL-00078. TWA calculation based on the PCM analysis results for the remaining dates showed no exposures above the PEL. ISO 10312 results for all personal samples are presented in Appendix A.

All excursion limit samples collected on Stimson employees showed PCM results significantly lower than the OSHA-defined excursion limit of 1.0 f/cc. Asbestos structures were detected on two excursion limit samples by TEM AHERA analysis: Samples SL-00026 and SL-00052. SL-00026 was collected on Mechanic 2 in central maintenance on September 11, 2002. SL-00052 was collected on the Wagner operator on September 12, 2002. Asbestos structures were not detected on the remaining excursion limit samples by TEM AHERA analysis. A summary of excursion limit sample results is presented in Table 3-3.

3.2 Ambient Air Sampling

A total of 43 ambient air samples were collected. These samples were collected inside buildings and outdoors to determine general background asbestos concentration levels at the Stimson facility. All locations were approved by EPA prior to sampling.

3.2.1 Sample Locations

As presented in the SAP, ambient air sampling was conducted in three facility buildings on the Stimson property. These buildings included the plywood plant, central maintenance building, and the FJ building (Figures 1-1 and 1-2). Ambient air

sampling was also conducted at two outdoor locations on the Stimson property and included the employee parking lot (near the former popping plant) (Figure 1-2) and the log yard (Figure 1-3). Samples were collected during normal daily operations while facility equipment was operational. Sampling locations are summarized in Table 3-4.

**Table 3-4
Ambient Air Sampling Locations**

Location	Sample Location	No. of Samples
Central Maintenance (BD-002098)	Center of machine shop	1
	Center of south end of building	1
	East side center of building	1
	North end center of building	3
	Replicate – north end center of building	3
Plywood Plant (BD-002099)	Outside de-barker cab	1
	Green chain exterior wall opposite supervisor's office	4
	Plugger alley next to plugger No. 9	4
	Dryers next to post at feed end	4
	Spreaders at post near pre-press	3
	Inside de-barker cab	1
Finger Joint building (BD-002097)	Outside lunch room in main plant area	2
	Near entrance to feeder No. 2 room	2
	Near former lunch room	2
Employee Parking Lot	Southeast corner	1
	Northwest corner	1
	Center of south side of lot	1
	In railroad tracks, north of roadway	1
Log Yard	Outside log truck scale shed	2
	Outside storage shed	1
	At trailer crane by fire pond	2
	Near head gate	2

3.2.2 Sample Collection

All ambient air samples collected between September 11 and September 18, 2002, were collected according to the EPA Standard, *Operating Procedure (SOP) 2015 Asbestos Sampling* (Appendix B). All ambient air sampling pumps were calibrated prior to the sampling period and again at the end of the sampling period. Air samples were collected using 0.8 μ m open-faced 25mm MCE filters. All air sampling cassettes were inspected during sampling to determine if filter overloading was occurring.

All field blanks analyzed during this investigation returned results of ND, or no fibers detected at or above the detection limit. Field blank results are included in the Libby database printout presented in Appendix A.

Specific cassette lot blanks analyzed during this project included MCE filters for lot numbers 21078 and 4583. All lot blanks analyzed during this investigation returned results of ND, or no fibers detected at or above the detection limit for the analytical method. Lot blank results are included in the Libby database printout presented in Appendix A. As a means of assessing sample variability during ambient air sampling, three replicate samples from the central maintenance building were collected.

3.2.3 Sample Analysis

Air samples were analyzed by EMSL Analytical, Inc. in Libby, Montana, and Westmont, New Jersey; Reservoirs Environmental Services in Denver, Colorado, and/or Hygeia in Sierra Madre, California. All samples were analyzed by ISO 10312, *Air Quality - Determination of Asbestos Fibers - Direct Transfer Transmission Electron Microscopy Method*, 1995; NIOSH Method 7400, *Asbestos and other Fibers by Phase Contrast Microscopy (PCM)*; and/or Appendix A of EPA *Asbestos - Containing Materials in Schools: Final Rule and Notice*.

Samples were maintained under chain of custody procedures. After sample collection was completed, EPA custody labels were completed and affixed to each sampling cassette. Sample information was entered on chain of custody forms, and changes in sample custody noted on the form. Samples were relinquished to the sample coordinator and submitted for laboratory analysis. Any samples not immediately relinquished to the sample coordinator were maintained under chain of custody. Samples were either hand-delivered to the EMSL onsite laboratory in Libby, Montana, or shipped via Federal Express to an offsite laboratory.

3.2.4 Summary of Results

A total of 42 stationary air samples were collected and analyzed in Stimson buildings. A summary of stationary sample locations and results, including PCM and TEM AHERA analysis results, is presented in Table 3-5. A complete list of results, including those for ISO 10312 analysis, is presented in Appendix A.

Of the nine samples collected in the Central Maintenance building, fibers were not detected at levels at or above 0.01 f/cc by PCM analysis. Asbestos structures were detected on one of the nine samples (SL-00223) by TEM AHERA analysis, collected at the center of the north end of the building.

Of the 15 samples collected throughout the Plywood Plant, fibers were detected at values at greater than 0.01 f/cc by PCM analysis in 7 samples. Three of the samples, SL-00079, SL-00092, and SL-00107, were located along the green chain exterior wall, opposite the supervisor's office. Two samples, SL-00243 and SL-00245, were located at the spreaders, at a post near the pre-press. The remaining three samples at or above 0.01 f/cc were SL - 00092, SL - 00106, and SL-00215. SL-00092 was located at plugger alley, next to plugger No. 9; SL-00106 was located at the dryers, at a post near the feed end; and SL-00215 was located in the debarker cab. Asbestos structures were not detected in any of the 15 samples by TEM AHERA analysis.

On five of the six samples collected in the FJ building, fibers were not detected at levels at or above 0.01 f/cc by PCM analysis. The sixth sample, SL-00196, collected near the entrance to feeder No. 2 room, was overloaded by PCM analysis. Asbestos structures were detected in two of the six samples by TEM AHERA analysis, SL-00162 and SL-00163. SL-00162 was collected outside the lunch room in the main plant area, and SL-00163 was collected near the entrance to feeder No. 2 room.

Table 3-5
Stationary Air Sampling Results

Building	Location Description	Index ID	Sample Date	Sample Time (min)	PCM Lab Result (f/cc)	TEM AHERA Lab Result* (S/cc)
Central Maintenance	Center of machine shop	SL-00020	9/11/2002	480	<0.001	ND
Central Maintenance	Center of south end of building	SL-00021	9/11/2002	490	<0.001	ND
Central Maintenance	East side of center of building	SL-00022	9/11/2002	491	<0.001	ND
Central Maintenance	Center of north end of building	SL-00023	9/11/2002	479	<0.001	ND
Central Maintenance	Center of north end of building	SL-00024	9/11/2002	479	<0.001	ND
Plywood Plant	Green chain, exterior wall opposite supervisor's office	SL-00079	9/13/2002	184	0.01	ND
Plywood Plant	Plugger Alley, next to Plugger No. 9	SL-00081	9/13/2002	168	0.009	ND
Plywood Plant	Dryers, at post a feed end, near control panel	SL-00082	9/13/2002	135	0.005	ND
Plywood Plant	Dryers, at post a feed end, near control panel	SL-00090	9/13/2002	93	0.006	ND
Plywood Plant	Green chain, exterior wall opposite supervisor's office	SL-00091	9/13/2002	110	0.006	ND
Plywood Plant	Plugger Alley, next to Plugger No. 9	SL-00092	9/13/2002	72	0.021	ND
Plywood Plant	Dryers, at post a feed end, near control panel	SL-00094	9/13/2002	108	0.008	ND
Plywood Plant	Plugger Alley, next to Plugger No. 9	SL-00096	9/13/2002	137	0.005	ND
Plywood Plant	Green chain, exterior wall opposite supervisor's office	SL-00102	9/13/2002	87	0.014	ND
Plywood Plant	Dryers, at post a feed end, near control panel	SL-00106	9/13/2002	247	0.011	ND
Plywood Plant	Green chain, exterior wall opposite supervisor's office	SL-00107	9/13/2002	248	0.026	ND
Plywood Plant	Plugger Alley, next to Plugger No. 9	SL-00111	9/13/2002	242	0.008	ND
Plywood Plant	Debarker cab	SL-00215	9/17/2002	436	0.077	ND
Plywood Plant	Spreaders, at post near pre-press	SL-00243	9/18/2002	190	0.018	ND
Plywood Plant	Spreaders, at post near pre-press	SL-00245	9/18/2002	247	0.041	ND
Employee Parking Lot	Southeast corner	SL-00127	9/14/2002	465	0.001	ND
Employee Parking Lot	Center of south side of lot	SL-00128	9/14/2002	465	0.001	ND
Employee Parking Lot	Northwest corner	SL-00129	9/14/2002	457	0.001	ND
Employee Parking Lot	In railroad tracks, north of roadway	SL-00130	9/14/2002	459	0.002	ND
Finger Joint	Outside lunch room, in main plant area	SL-00162	9/16/2002	267	0.002	0.004
Finger Joint	Near entrance to Feeder No. 2 room	SL-00163	9/16/2002	266	0.001	0.004
Finger Joint	Near former lunch room	SL-00164	9/16/2002	266	0.004	ND
Finger Joint	Outside lunch room, in main plant area	SL-00195	9/16/2002	221	0.002	ND
Finger Joint	Near entrance to Feeder No. 2 room	SL-00196	9/16/2002	219	Overload	ND
Finger Joint	Near former lunch room	SL-00197	9/16/2002	218	0.005	ND
Log Yard	Outside log yard log truck scale shed	SL-00167	9/16/2002	233	0.001	ND
Log Yard	Outside log yard storage shed	SL-00168	9/16/2002	406	0.001	ND
Log Yard	At trailer crane by fire pond	SL-00181	9/16/2002	209	0.002	ND
Log Yard	Along service road, near head gate	SL-00182	9/16/2002	150	<0.002	ND
Log Yard	Outside log yard log truck scale shed	SL-00203	9/16/2002	188	0.002	ND
Log Yard	At trailer crane by fire pond	SL-00204	9/16/2002	193	0.002	ND
Log Yard	Along service road, near head gate	SL-00244	9/18/2002	424	0.001	ND
Central Maintenance	Center of north end of building	SL-00213	9/17/2002	218	<0.001	ND
Central Maintenance	Center of north end of building	SL-00214	9/17/2002	218	<0.001	ND
Central Maintenance	Center of north end of building	SL-00222	9/17/2002	293	0.001	ND
Central Maintenance	Center of north end of building	SL-00223	9/17/2002	293	0.001	0.003

* ND - Indicates no Libby Amphibole structures detected by TEM AHERA analysis.

AHERA - Asbestos Hazardous Emergency Response Act

f/cc - Fibers per cubic centimeter

min - Minutes

PCM - Phase contrast microscopy
S/cc - Structures per cubic centimeter
TEM - Transmission electron microscopy

Of the four samples collected in the employee parking lot, fibers were not detected at levels at or above 0.01 f/cc by PCM analysis. Asbestos structures were not detected in any of the four samples by TEM AHERA analysis.

Of the seven samples collected in the log yard, fibers were not detected at levels at or above 0.01 f/cc by PCM analysis. Asbestos structures were not detected on any of the seven samples by TEM AHERA analysis.

Section 4

Microvacuum Dust Sampling

A total of 36 microvacuum dust samples were collected from buildings at Stimson. Stimson employees identified buildings as containing vermiculite or not containing vermiculite. One microvacuum dust sample was collected from each building not known to contain vermiculite. Up to five microvacuum dust samples were collected from each building known to contain vermiculite. All samples were composite samples consisting of two to three 100 centimeters squared (cm²) sub-samples per cassette. All locations were approved by EPA prior to sampling.

4.1 Sample Locations

Microvacuum dust samples were collected from several buildings at Stimson. An overview of the entire property is shown on Figures 1-2 and 1-3.

Buildings that contain identified vermiculite in which five microvacuum dust samples were collected were:

- Central Maintenance Facility (BD-002098)
 - Machine shop
 - South end of central maintenance building
 - Center of central maintenance building
 - Northern end of central maintenance building
 - Supervisor's office and break room
- Plywood Plant (BD-002099)
 - Break room and office at finish end
 - Plugger area
 - Spreaders and finish end
 - Green chain
 - Dryer area

Buildings that do not contain vermiculite in which two microvacuum dust samples were collected:

- Finger joint building (BD-002097)
 - Former lunchroom (now parts storage)
 - Doorways & entrances
- Truck barn (BD-002110)
 - North side
 - South end of building

- Stimson office (BD-002269)
 - First floor
 - Second floor
- Buildings that do not contain vermiculite in which one microvacuum dust sample was collected:
 - Log yard break building (BD-002100)
 - Log yard storage building (BD-002101)
 - Log yard oil storage shed (BD-002102)
 - Log yard pump house (BD-002103)
 - Log yard truck scale shed (BD-002104)
 - Irrigation building (BD-002105)
 - Diesel fire pump house (BD-002106)
 - Double wide trailer (BD-002107)
 - Electric pump house (BD-002108)
 - Guard station at Libby Creek Bridge (BD-002109)
 - Steel storage (BD-002111)
 - Fire hall (BD-002112)
 - Wagner shed (BD-002260)
 - Electric motor shed (BD-002261)
 - Astrodome (BD-002262)
 - Pipe shed (BD-002263)
 - Storage & locomotive shed (BD-002264)
 - Power house office (BD-002265)
 - Power house (BD-002266)
 - Lumber kilns (BD-002267)
 - Shed 12 (BD-002268)

4.2 Sample Collection

All microvacuum dust samples collected between September 12 and September 18, 2002, were collected in accordance with the American Society for Testing Materials (ASTM) Standard D-5755-95, Standard Test Method for Microvacuum Sampling and Indirect Analysis Dust by Transmission Electron Microscopy for Asbestos Structure Number Concentrations (Appendix D). Up to three separate 100 cm² areas per cassette for a total of up to 300 cm² per cassette. Samples were collected in each 100 cm² area for 2 minutes or until all visible dust had been removed. Sampling was performed using 0.45 µm MCE filters. All sampling pumps were calibrated from 2.03 to 2.05 lpm prior to the sampling period and again at the end of the sampling period.

All field blanks analyzed during this investigation returned results of ND, or no structures detected at or above the detection limit for the analytical method. Field blank results are included in the Libby database printout presented in Appendix A.

Specific cassette lot blanks analyzed during this project included filters from Lot Number 410FKA.

All lot blanks analyzed during this investigation returned results of ND, or no fibers detected at or above the detection limit for the analytical method. Lot blank results are included in the Libby database printout presented in Appendix A.

4.3 Sample Analysis

Air samples were analyzed by EMSL Analytical, Inc. in Libby, Montana, and Westmont, New Jersey; Reservoirs Environmental Services in Denver, Colorado, and/or Hygeia in Sierra Madre, California. All samples were analyzed in accordance with the ISO 10312, *Air Quality - Determination of Asbestos Fibers - Direct Transfer Transmission Electron Microscopy Method*, 1995.

Samples were maintained under chain of custody procedures. After sample collection was completed, EPA custody labels were completed and affixed to each sampling cassette. Sample information was entered on chain of custody forms, and changes in sample custody noted on the form. Samples were relinquished to the CDM sample coordinator to be submitted for laboratory analysis. Any samples not immediately relinquished to the sample coordinator were secured in the sample storage cabinet. Samples were either hand-delivered to the EMSL onsite laboratory in Libby, Montana, or shipped via Federal Express to an offsite laboratory.

4.4 Summary of Results

LA structures were detected in two of the samples collected in the central maintenance building (BD-002098). Analysis identified 8823.1 LA structures with lengths between 0.5 μm and 5 μm in sample SL-00061, which was a composite of one locations in each of the Cummins engine room, Cat engine room, and large jack stand in the main work area. Analytical results indicate 882.31 LA structures with lengths between 0.5 μm and 5 μm were detected on SL-00064, which was a composite of three locations in the supervisor's office and break room (Table 4-1). Additionally, sample results for SL-00059 identified 4411.6 LA structures with lengths between 0.5 μm and 5 μm . Composites for this sample were collected in the machine shop.

LA structures were detected in one of the samples collected in the truck barn (BD-002110). Results identified 1971.3 LA structures with length between 0.5 μm and 5 μm and 985.7 LA structures with length between 5 μm and 10 μm were detected on SL-00225, which was a composite of three locations on the south side of the truck barn. No LA structures were detected in the samples collected on the north side of the truck barn (BD-002110, SL-00224) (Table 4-1).

LA structures were detected on both of the samples collected in the Stimson office building (BD-002269). Results for sample SL-00241 identified 262.84 LA structures with lengths between 0.5 μm and 5 μm , which was a composite of three locations on the first floor of the Stimson office building. Analysis also identified 131.42 LA

Table 4-1
Microvacuum Dust Sampling Results

Building	Location Description	Index ID	Subsample Locations (100 cm ²)	Sample Area (cm ²)	Lab Results*			
					Excluded Structures Diameter > 0.5 µm	Libby Amphibole		
						Length 0.5 µm to 5 µm	Length 5 µm to 10 µm	Length > 10 µm
Central Maintenance	Machine shop	SL-00059	Floor in front of sliding door to main area	300	0	4411.6	0	0
			Floor in front of rear sliding door, opposite above					
			Blade on large fan stored in rear corner					
Central Maintenance	South end of CM building	SL-00060	On workbench near machine shop door	300	0	0	0	0
			In front of third vehicle door from south end					
			Center of fourth vehicle area from south end					
Central Maintenance	Center of CM building	SL-00061	Workbench in rear of Cummins Engine Room	300	0	8823.1	0	0
			Between 5th vehicle door from south & Cat engine rm.					
			Top of large jack stand near door					
Central Maintenance	North end of CM building	SL-00062	On shelf in warehouse in NE corner of building	300	0	0	0	0
			On top shelf in NE corner of main work area					
			Floor in center of north end of building					
Central Maintenance	Supervisor's office and break room	SL-00064	Top of CB unit in supervisor's office	300	0	882.3	0	0
			Top of refrigerator in break room					
			Top of soda machine in break room					
Finger Joint	Former lunch room	SL-00065	Floor in front of front door	300	0	0	0	0
			Floor in front of rear door					
			On shelf to left of front door					
Finger Joint	Doorways & entrances	SL-00066	Floor at pedestrian entrance to break room	300	0	0	0	0
			Floor at west vehicle door					
			Floor at entrance to wrap & stack area, from main area					
Log Yard Break Building	NA	SL-00169	Floor at entrance	300	0	0	0	0
			Floor, doorway between rooms					
			Top of microwave oven					
Log Yard Storage Shed	NA	SL-00170	Floor at entrance	300	0	0	0	0
			Floor, center of room					
			Top of workbench					
Log Yard - Oil Storage	NA	SL-00171	Floor at entrance	300	0	4411.6	0	0
			Floor, near end of tank					
			On shelf					
Log Yard - Pump House	NA	SL-00172	Floor at entrance	300	0	0	0	0
			Floor next to engine base					
			On engine base					
Log Yard - Log truck scale shed	NA	SL-00173	First floor - floor at entrance	300	0	0	0	0
			First floor - desktop					
			Second floor - doorjamb					
Irrigation Building	NA	SL-00174	Floor at entrance	300	0	4411.6	0	0
			Floor of doorway between rooms					
			Floor near center of front (entrance) room					

Table 4-1
Microvacuum Dust Sampling Results

Building	Location Description	Index ID	Subsample Locations (100 cm ²)	Sample Area (cm ²)	Lab Results*			
					Excluded Structures Diameter > 0.5 µm	Libby Amphibole		
						Length 0.5 µm to 5 µm	Length 5 µm to 10 µm	Length > 10 µm
Diesel Fire Pump House	NA	SL-00175	Floor at entrance	300	0	4411.6	0	0
			Floor next to pump					
			Top of cabinet					
Double Wide Trailer	NA	SL-00176	Floor at entrance	300	0	0	0	0
			Floor in front of kitchen area cabinets					
			Floor at bathroom entrance					
Electric Pump House	NA	SL-00177	Floor at front entrance	300	0	4411.6	0	0
			Floor at entrance to extension room					
			Floor at rear entrance					
Guard Station at Libby Creek Bridge - North Gate	NA	SL-00178	Floor at entrance	300	0	0	0	0
			Floor at counter to left of door (when looking into booth)					
			Countertop to right of door					
Plywood Plant	Break rooms & offices at finish end	SL-00217	Break room, floor near door to plant	300	0	0	0	0
			Second floor - shift super office, floor near entrance					
			First floor - floor near entrance to plant, NW corner					
Plywood Plant	Plugger Area	SL-00218	Floor near Plugger No. 1	300	0	0	0	0
			Floor near Plugger No. 9, storage side					
			Floor near turntable					
Plywood Plant	Spreaders and finish end	SL-00219	Floor near spreaders	200	0	0	0	0
			Floor near spreaders					
			Floor along center of chain, plant side					
Plywood Plant	Green chain	SL-00220	Floor outside lunch/smoking area	300	0	0	0	0
			Floor near lathe					
			Floor near entrance/break room/restrooms					
Plywood Plant	Dryer area	SL-00221	Floor near feeder for little dryer	300	0	0	0	0
			Floor at offbearer end, under belt					
			Floor near entrance					
Truck Barn	North side	SL-00224	Top of workbench/storage box	300	0	0	0	0
			Floor towards rear of building					
			Horizontal beam on dividing wall					
Truck Barn	South side	SL-00225	Doorjamb floor	200	0	1971.3	985.7	0
			Concrete floor					
			Horizontal beam on dividing wall					
Steel Storage	NA	SL-00226	Pipe stored in shed	300	0	0	0	0
			Floor at vehicle entrance					
			Top of workbench					
Fire Hall	NA	SL-00227	Third step up on stairs to second floor	300	0	0	0	0

Table 4-1
Microvacuum Dust Sampling Results

Building	Location Description	Index ID	Subsample Locations (100 cm ²)	Sample Area (cm ²)	Excluded Structures	Lab Results*			
						Diameter > 0.5 µm		Libby Amphibole	
						Length 0.5 µm to 5 µm	Length 5 µm to 10 µm	Length > 10 µm	Length
Wagner Shed	NA	SL-00228	Horizontal beam on side wall Shelf on rear wall	200	0	394.3	0	0	0
Electric Motor Shed	NA	SL-00229	Floor at overhead door entrance On storage shelf Second floor at entrance to storage area	300	0	328.6	0	0	0
Astrodome	NA	SL-00230	Horizontal beam on long wall Floor near exposed corner Horizontal base beam on short wall	300	0	0	0	0	0
Pipe Shed	NA	SL-00231	Floor in front of door Top of workbench Top of storage shelf	300	0	0	0	0	0
Storage & Locomotive Shed	NA	SL-00232	Floor at center doorway Top of storage bin Between train rail tracks	300	0	375.5	375.5	0	0
Power House Office	NA	SL-00237	Floor in front of door Top of refrigerator	200	0	0	0	0	0
Power House	NA	SL-00238	Floor in front of door near office Floor in front of door near diesel tanks Horizontal beam in garage	300	0	0	0	0	0
Lumber Kilns	NA	SL-00239	Floor of infeed at first bay Floor in center of bay No. 15 Floor in center of tunnel of north side	300	0	0	0	0	0
Shed 12	NA	SL-00240	Floor at north entrance Horizontal beam on wall Floor at top of ramp to FJ building	300	0	0	0	0	0
Stimson Office Building	First Floor	SL-00241	Floor at back entrance Floor mat at front entrance Top of stairs to conference room	300	0	262.8	0	0	0
Stimson Office Building	Second Floor	SL-00242	Floor at back entrance Floor in front of men's room Top of refrigerator	300	0	131.4	0	0	0
Nursery Shed	Concrete Floor	1-06850	Center of main section West end of main West room, center of floor	300	0	0	0	0	0
Nursery Shed	Standing wood, debris removed from walls	1-06857	Top of wood piles at east end of main Top of wood pile at west end of main South wall, west room on ground level, horizontal beam	300	0	5853.1	1170.6	0	0

* Laboratory also reports chrysotile and other amphiboles. See Appendix D for complete results.

structures with lengths between 0.5 μm and 5 μm in sample SL-00242, which was a composite of three locations on the second floor of the Stimson office building (BD-002269).

Analytical results presented 4411.6 LA structures with lengths between 0.5 μm and 5 μm on four samples:

- SL-00171, a composite of three locations in the log yard oil storage building (BD-002102)
- SL-00174, a composite of three locations on the irrigation building floor (BD-002105)
- SL-00175, a composite of three locations in the diesel fire pump house (BD-002106)
- SL-00177, a composite of three locations on the electric pump house floor (BD-002108)

Analysis of sample SL-00228 identified 394.26 LA structures with lengths between 0.5 μm and 5 μm , which was a composite of two locations in the Wagner shed (BD-002260).

Analysis identified 328.55 LA structures with lengths between 0.5 μm and 5 μm in sample SL-00229, which was a composite of three locations in the electric motor shed (BD-002261).

Analytical results of sample SL-00232 identified 375.5 LA structures with lengths between 0.5 μm and 5 μm and 375.5 LA structures with length between 5 μm and 10 μm , which was a composite of three locations in the storage and locomotive shed (BD-002264).

LA structures were not detected on samples collected in the following buildings:

- Plywood plant (BD-002099)
- Finger joint building (BD-002097)
- Log yard break building (BD-002100)
- Log yard storage building (BD-002101)
- Log yard pump house (BD-002103)
- Log yard truck scale shed (BD-002104)
- Double wide trailer (BD-002107)
- Guard station at Libby Creek bridge (BD-002109)
- Steel storage (BD-002111)
- Fire hall (BD-002112)
- Astrodome (BD-002262)
- Pipe shed (BD-002263)
- Power house office (BD-002265)
- Power house (BD-002266)
- Lumber kilns (BD-002267)
- Shed 12 (BD-002268)

Section 5

Quality Assurance

The field quality assurance program was designed in accordance with CDM's RAC VIII *Quality Management Plan*, Revision 1 (CDM 2002d).

5.1 Adherence to the Sampling and Analysis Plan

All sampling was completed in accordance with the *Property Specific Sampling and Analysis Plan (SAP)*, *Air and Dust Sampling for Stimson Lumber Company, Libby Asbestos Project, Libby, Montana* (CDM 2002a). Deviations from the SAP are addressed in Section 5.2.

5.2 Deviations

All of the personal samples were collected in accordance with the SAP. Deviations were made while collecting ambient air samples and dust samples, as discussed in Section 5.2.1.

5.2.1 Deviations During Ambient Air Sample Collection

According to the SAP, approximately four ambient samples were to be collected at each specific sampling location. This number was changed to collect samples more representative of normal working conditions in each location. Additional samples were collected in the larger buildings. Five ambient samples were collected in the central maintenance building and the plywood plant, and three samples in the FJ building.

Normal work activities at Stimson generated significant amounts of airborne particulates. In an effort to collect more representative ambient air samples and prevent filter overload, less than the standard volume of air (4,000 liters) for 33 ambient air samples was collected. Also, less than 4,000 liters was collected during sample recollection. Samples were recollected when the laboratory indicated that previous samples collected in that location were overloaded.

On September 11, 2002, ambient samples were collected in the central maintenance building. Greater than 4,000 liters of air was collected for these samples, but there was concern about sample overload since the filters appeared to be more than 30 percent loaded by visual inspection. On September 16, 2002, samples were recollected in the same location. Less than 4,000 liters of air was collected for the resampling to prevent sample overload.

On September 13, 2002, ambient samples were collected in the plywood plant. On that date, there were high levels of visible airborne dust throughout the plant. Sample cassettes were changed out at less than 4,000 liters to prevent filter overloading. Plant employees and Ms. Bovee later explained that the bag house was not functioning properly on that date. The bag house collects airborne particulates from the plant. On September 13, 2002, the "bags" were overfull, which resulted in higher than normal levels of airborne dust in the plant. According to Ms. Bovee, the bags were changed out on September 15, 2002. Samples were recollected near the spreaders on September 18, 2002. Less than 4,000 liters of air was collected to avoid filter overloading.

The debarker is located outside the plant building but generates a significant amount of sawdust during normal operation. On September 13, 2002, samples were collected outside the debarker's operator cab in the very dusty environment of the debarker. These cassettes were changed out at less than 4,000 liters. A sample was recollected inside the debarker cab on September 17, 2002. Less than 4,000 liters of air was collected to avoid filter overloading. Ambient air sampling cassettes collected in the FJ building and log yard were changed out at less than 4,000 liters to avoid filter overloading.

According to the SAP, replicate ambient air samples were to be collected at a rate of one per sampling location. In two locations (log yard and parking lot), insufficient electrical supply made replicate sampling infeasible. In addition, replicate samples collected in the plywood plant were among those that were overloaded and unreadable. As a result, three readable replicate samples were analyzed during this project.

5.2.2 Deviations During Dust Sample Collection

According to the SAP, one dust sample was to be collected in buildings that do not contain identified vermiculite. In three such buildings, two dust samples were collected. Due to the large size of these buildings, two samples would better characterize the interior of the building space.

5.3 Corrective Actions

In an effort to prevent ambient air sample overload and prevent indirect sample preparation, samples were recollected using reduced total sample volumes and/or collected with multiple representative samples.

5.4 Discussion of Quality Control Results

Laboratory analysis of the lot blanks indicated asbestos fiber counts were below the detection limit of the analytical method. Laboratory analysis of the field blanks indicated asbestos fiber counts were below the detection limit of the analytical method. The QC results indicate that the sampling cassettes were not contaminated with asbestos when received from the supplier and that cassettes were not contaminated when they were handled in the field.

Laboratory analysis of the replicate ambient air samples indicated that the replicate sample results were within ± 10 percent of the adjacent ambient air sample. The results of the replicate samples indicate that sample variability was within an acceptable range.

Section 6

References

American Society for Testing and Materials (ASTM). 1995. Standard D-5755-95, Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Concentrations.

CDM Federal Programs Corporation (CDM). 2002a. *Property Specific Sampling and Analysis Plan (SAP), Air and Dust Sampling for Stimson Lumber Company, Libby Asbestos Project, Libby, Montana.*

_____. 2002b. Final Sampling and Analysis Plan (SAP) for the Remedial Investigation (RI) Contaminant Screening Study (CSS), Libby Asbestos Site, OU4. Libby, Montana. April.

_____. 2002c. Final SAP Addendum for the Stimson Lumber Company Area, Libby Asbestos Site, OU4. Libby, Montana.

_____. 2002d. *Quality Management Plan*, Revision 1.

International Organization of Standards (ISO) 10312. 1995. Determination of Asbestos Fibers - Direct Transfer Transmission Electron Microscopy Method.

National Institute of Occupational Safety and Health (NIOSH). 1995. Method 7400. Asbestos and other Fibers by Phase Contrast Microscopy (PCM).

U. S. Environmental Protection Agency (EPA). 2002. Action Memorandum Amendment for the Time-Critical Removal Action at the Libby Asbestos Site, Libby, Lincoln County, Montana. May.